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R11

The current SCaN infrastructure provides the communication link to Earth for all of NASAs scientific missions. SCaNs current communication network architecture, known as Phase 0, builds upon and incorporates technologies developed by NASA with international partners under the auspices of the Consultative Committee for Data Systems (CCSDS)). Under Phase 0, SCaN manages radios, ground stations, and the Earth Based Relay Element (EBRE) also known as the Tracking and Data Relay Satellite System (TDRSS). Missions use SCaN networks as a mechanism to pass data through from their in-space asset to the user on the ground [Figure 4]. The mission controls all addressing of mission assets as demonstrated in the current CCSDS datalink protocols [CCSDS135]. All data routing is currently manually configured because there is no unique addressing of space systems that is understood by intermediate points and, therefore, no easy way to automatically route end-to-end. As such, it is difficult to put cognition into the communication path (except, perhaps, within the radios themselves) since addressing is mission unique and forwarding is manually configured albeit perhaps with scripts. DTN has the potential to create a universally unique addressing space across space system. However, to date, there are known problems with how node addressing is currently handled as identified by JPL [Burleigh2012]. When the Space Packet Protocol is used for end-to-end routing, Space Packets are usually transferred with a Space Link Extension (SLE) Service in the ground subnetwork. SLE enables extension of the datalink between spacecraft and mission operation by effectively encapsulating the datalink into Internet Protocol packets and routing over the Internet. A well-architected network will greatly simplify the infusion of cognition technologies. As stated in the Space Internetworking study, There is no existing SCaN capability or network infrastructure to support Space Internetworking (SI). Since users do not see SI implementations or plans for implementation, their confidence that SI capability will work as advertised is reduced. Lack of SI infrastructure also reduces future user confidence that the SI capabilities will be available when they are needed to support future missions. However, the Space Network Ground Segment Sustainment (SGSS) project is holding requirements to implement IP over Advanced Orbiting System Encapsulation (AOS/ENCAP) and High-Level Data Link Control (HDLC) for forward and return links requirements that can be leveraged for implementation of SI. [SI]

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R10 - JDS

The current SCaN infrastructure provides the communication link to Earth for all of NASAs scientific missions. SCaNs current communication network architecture, known as Phase 0, builds upon and incorporates technologies developed by NASA with international partners under the auspices of the Consultative Committee for Data Systems (CCSDS)). Under Phase 0, SCaN manages radios, ground stations, and the Earth Based Relay Element (EBRE) also known as the Tracking and Data Relay Satellite System (TDRSS). Missions use SCaN networks as a mechanism to pass data through from their in-space asset to the user on the ground. The mission controls all addressing of mission assets as demonstrated in the current CCSDS datalink protocols [CCSDS135]. All data routing is currently manually configured due to the unique addressing schemes utilized by space systems and the intermediate connection nodes. A schema for automatic, end-to-end route generation is needed to enable cognition capabilities within the communication path. DTN has the potential to create a universally unique addressing space across space systems via standardization within CCSDS enabling the initial aspects of cognition+. The Internet Research Task Force (IRTF) is currently examining the node addressing space issues as identified by ,[Burleigh2012] for future CCSDS consideration. When the Space Packet Protocol is used for end-to-end routing, Space Packets are usually transferred with a Space Link Extension (SLE) Service in the ground subnetwork. SLE enables extension of the datalink between spacecraft and mission operation by effectively encapsulating the datalink into Internet Protocol packets and routing over the Internet. A well-architected network will greatly simplify the infusion of cognition technologies. As stated in the Space Internetworking study, There is no existing SCaN capability or network infrastructure to support Space Internetworking (SI). Since users do not see SI implementations or plans for implementation, their confidence that SI capability will work as advertised is reduced. Lack of SI infrastructure also reduces future user confidence that the SI capabilities will be available when they are needed to support future missions. However, the Space Network Ground Segment Sustainment (SGSS) project is holding requirements to implement IP over Advanced Orbiting System Encapsulation (AOS/ENCAP) and High-Level Data Link Control (HDLC) for forward and return links requirements that can be leveraged for implementation of SI. [SI]